REMARKS

Applicants concurrently file herewith a petition (and fee) for one-month extension of time.

Claims 38, 45, 54, 58, 63, 64, 75, and 82-84 are all the claims presently pending in the application. Applicants have amended various claims, and added new claims 82-84, to define the claimed invention more particularly, to define a new patentable claim, and to raise a new issue for the Examiner's consideration, thereby precluding a First Action Final Rejection. Further, Applicants have cancelled claims 40-44, 55-57, 59-62, and 76-81 without prejudice or disclaimer

It is noted that the claim amendments herein, if any, are made only to more clearly and completely define the invention and to assure grammatical and idiomatic English and improved form under United States practice, and are not made to distinguish the invention over the prior art, or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicants submit that the cited references fail to teach or suggest the claimed invention.

That is, with regard to claims 38, 39, and 58, the alleged references, either alone or in combination (arguendo), fail to teach or suggest, "*creating a plasma atmosphere in a plasma-generating area which is at least one region of a reaction chamber by plasmatizing a source material comprising carbon, hydrogen, and fluorine as essential components;*

introducing hydrogen radicals generated by decomposing a radical source comprising hydrogen in a radical-generating area, which is disposed in the reaction chamber and is located outside the plasma-generating area, into the plasma atmosphere, the radicals being generated by applying microwaves, Ultra High Frequency (UHF) waves, Very High Frequency (VHF) waves, or Radio Frequency (RF) waves to the radical source; and

growing carbon nanowalls on a base material disposed in the reaction chamber,

wherein an amount of the radicals in the at least one region is measured, and

wherein at least one of a feed rate of the source material and a feed rate of the radicals is controlled on a basis of the amount of the radicals," (emphasis added by Applicants) as recited in independent claim 38.

Indeed, the Examiner does not even allege that the cited references teach or suggest these features of the claimed invention.

With regard to the primary reference Hiramatsu (Fabrication of Carbon Nanowalls Using RF Plasma CVD), Applicant submits that Hiramatsu discloses that carbon nanowalls are grown by using C_2F_6 but does not disclose or suggest using hydrogen and fluorine as essential components, especially, CHF_3, as recited in claim 58.

Applicants note that because nanowalls have a special structure with a dimension of nano order, the growth mechanism is not analyzed and known. Accordingly a possibility of the growth by using C_2F_6 does not predict the possibility of the growth by using hydrogen and fluorine as essential components, especially, CHF_3. Thus, the cited references fail to teach or suggest claims 38, 39, and 58.

Further, Hiramatsu discloses that hydrogen radicals are generated outside the reaction chamber plasmatizing a source gas. Hiramatsu, however, does not disclose or suggest that hydrogen radicals are generated in an area other than a plasma-generating area, which is inside the reaction chamber. In Hiramatsu, hydrogen radicals are generated outside the reaction chamber and introduced in a direction parallel to a surface of a substrate.

In the claimed invention, hydrogen radicals are generated in an upper area of the reaction chamber (as more specifically defined in new claim 83) such that the hydrogen radicals can be introduced with keeping an original activity of hydrogen radicals, which could cause an easy growth when using hydrogen and fluorine as essential components, especially, CHF_3.

Also, because hydrogen radicals are generated in an upper area of the reaction chamber in the present invention, hydrogen radicals keeping the original activity can be introduced in a direction perpendicular to the surface of the substrate, as recited in claim 39. Therefore, the density of the hydrogen radicals applied to the substrate can be uniform. This allows carbon nanowalls to be uniformly formed on the substrate.

Further, in Hiramatsu, the hydrogen radicals are introduced in a direction parallel to the surface of the substrate such that the density of the hydrogen radicals applied to the substrate cannot be uniform. Therefore, carbon nanowalls cannot be uniformly formed on the substrate.

Moreover, in Hiramatsu, inactive hydrogen particles changed from radicals, which are eliminated, are more likely to be introduced in the reaction chamber because the hydrogen radicals are generated outside the reaction chamber. In the present invention, active hydrogen radicals are introduced in the source gas plasmatizing area because the hydrogen radicals are generated just above the source gas plasmatizing area.

Also, Hiramatsu does not disclose or suggest that during growing the carbon nanowalls an amount of the hydrogen radicals in the at least one region is measured and at least one of a feed rate of the source material and a feed rate of the radicals is controlled on a basis of the amount of the radical. This would cause an easy growth when using hydrogen and fluorine as essential components, especially, CHF_3. Thus, Hiramatsu fails to teach or suggest claims 38, 39, and 58.

Indeed, the claimed invention provides unexpected effects and cannot be easily taught or suggested by Hiramatsu.

Furthermore, Applicants submit that with regard to claim 75, the alleged references, either alone or in combination (arguendo), fail to teach or suggest, "*creating a plasma atmosphere in at least one region of a reaction chamber by plasmatizing a source material which comprises at least one compound selected from the group consisting of CH_4, CF_4, and CHF_3;*

introducing hydrogen radicals generated outside the plasma atmosphere into the plasma atmosphere; and

growing carbon nanowalls on a base material disposed in the reaction chamber," (emphasis added by Applicants) as recited in claim 75.

Applicants submit that carbon nanowalls are not mere carbon films. They are substances having a special nanostructure.

Hiramatsu does not disclose or suggest that CH_4, CF_4, and CHF_3 are source gases. When carbon nanowalls are grown by plasmatizing, a specific source gas should be selected. Configurations of the carbon nanowalls depend on the types of the gases used. The specification of the present Application (e.g., from line 6 on page 9 to the second line from the bottom of page 11) discloses that configurations of the carbon nanowalls depend on the types of the source gases. The specification also describes that configurations of the carbon nanowalls vary in the experiments using various source gases.

In other words, it is found only through the experiments which gas is useful in producing carbon nanowalls having good configurations. The inventors of the present invention have discovered that CH_4, CF_4, and CHF_3 gases can be used by generating hydrogen radicals in the area other than the source gas plasmatizing area and introducing the hydrogen radicals in the source gas plasmatizing area.

Therefore, carbon nanowalls having a good quality can be grown by using CH_4, CF_4, and CHF_3 gases, which cannot be taught or suggested by C_2F_6 gas disclosed by Hiramatsu. Thus, Hiramatsu fails to teach or suggest claim 75.

With regard the cited references other than Hiramatsu (i.e., Goto (US 5,980,999), Wu (US 2003/0129305), Kirimura (US 6,383,896), Nagasawa (US 2002/0072249), Smalley (US 6,683,783), Goruganthu (US 6,780,664), Merkulov (US 6,649,431), and Lee (US 2002/0046953)), Applicants submit that the alleged references do not disclose or suggest the growth of carbon nanowalls at all.

Indeed, the growth film of Goto is completely different from carbon nanowalls standing on a substrate. This is very clear by comparing Figs. 3A to 3D with Fig. 43 of the present Application. The difficulty of growing the carbon nanowalls should be considered at judging the novelty the present invention. Thus, Goto fails to make up the deficiencies of Hiramatsu.

Furthermore, Nagasawa discloses a method of forming silicon carbide of uniform thickness and density on a Si substrate surface. Carbon nanowalls are not a film of uniform thickness and have a particular nanostructure. Therefore, whether carbon nanowalls having a particular structure can be grown by using the gas used to form a uniform thick film of silicon carbide cannot be taught or suggested by the alleged reference. Therefore, in Nagasawa, there is no motivation to use the gas for forming a uniform thick film disclosed by Nagasawa, to form carbon nanowalls in Hiramatsu. Thus, Nagasawa fails to make up the deficiencies of Hiramatsu.

Moreover, Kirimura discloses a method for forming a silicon based film with a uniform thickness on a substrate. Kirimura, however, does not disclose or suggest at all that carbon nanowalls having a particular nanostructure are formed. Forming a film of uniform density is irrelevant to forming particular nanostructured carbon nanowalls. The method for forming a uniform thick film cannot be diverted.

In forming a carbon film, any one of mere graphene sheet, carbon nano tube, amorphous carbon film or particular nanostructured carbon nanowalls is formed. Therefore, the method of forming particular nanostructured carbon nanowalls by plasma CVD is new. Thus, Kirimura fails to make up the deficiencies of Hiramatsu.

Since the cited references other than Hiramatsu do not overcome the deficiencies of Hiramatsu, the combination of references fails to render the rejected claims obvious.

Therefore, Applicants respectfully submit that one with ordinary skill in the art would not have combined Hiramatsu with the teachings of the above-mentioned cited references other than Hiramatsu, and even if combined, the alleged combination would not have taught or suggested (or rendered obvious) each and every feature of the claimed invention.

FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 38, 45, 54, 58, 63, 64, 75, and 82-84, all the claims presently pending in the application, are patentably distinct over the prior art of record and are allowable, and that the application is in condition for allowance. Such action would be appreciated.

It is noted that, on the cover page of the Office Action dated August 4, 2010, Hiroyuki Kano is listed as the "First Named Inventor". However, Hiroyuki Kano is not an inventor in this Application. Indeed, a Supplemental Executed Declaration was filed on January 22, 2007 replacing the erroneous Declaration filed on May 5, 2006 that included Hiroyuki Kano as an inventor.

However, when a corrected filing receipt was issued on April 24, 2009, Hiroyuki Kano's name was included as an inventor, when it was previously and correctly removed from the filing receipt. Further, no response has been received from the Third Request for Corrected Official Filing Receipt submitted on April 26, 2010. Therefore, Applicants respectfully make a fourth request for a Corrected Official Filing Receipt that does not include Hiroyuki Kano as being an inventor of this Application.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned attorney at the local telephone number listed below to discuss any other changes deemed necessary for allowance in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Date: 12/3/10

Respectfully Submitted,

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